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Semi-Annual Report

(Report No. 2)

for the period

1 January 1965 through 30 June 1965

DEVELOPING A SYSTEM OF SOLAR FLARE PREDICTION

ARPA order #215, Amendment #14
Project Code #R002-10-01, 1-24

Name of Contractor:

The Regents of the University of Colorado
Boulder, Colorado

Date of Contract: January 1, 1965

Contract Expiration Date: December 31, 1966

Amount of Contract: \$17,500

Contract Number: Nonr 1147(13)

Project Scientist: Donald E. Billings
Professor, Astro-Geophysics
University of Colorado
Boulder, Colorado
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Head, Physics Branch
Physical Sciences Division
Office of Naval Research
Washington 25, D. C.

Attention: Director, ARPA

Reference: Contract #Nonr 1147(13) *Nonr*
Semi-Annual Report for the Period 1 January 1965
through 30 June 1965

Gentlemen:

Work on the contract during the report period was carried out by Mr. Lorne Avery under the direction of Dr. Billings.

Our approach to the problem of flare prediction this half-year has been to look for observational evidence that would have bearing on the understanding of flare mechanisms necessary for a successful system of flare prediction. We began the period with a study of the intervals between successive flares in a given region. We found that the distribution peaks rather sharply at 80-100 minutes for simple sunspot configurations, but that for more complex groups the intervals are shorter. We interpreted the results as favoring the hypothesis that the flare energy is supplied into the flaring region at a steady rate, but that the flare occurs when it has built up to an unstable level.

In attempting then to compute the rate of build-up, we were confronted with the question as to whether all of the flare energy discharged during the flash-phase of the flare, or whether the input continues at a decreasing rate throughout the duration of the flare. To answer this we needed to consider the various manifestations of flare energy. We find that X-ray curves covering the entire lifetime of flares are scarce, but that for two instances in which portions of curves are available there are good Climax rapid-sequence flare H α photographs. We are presently making light-curve studies of various portions of one of these in order to determine which part has light curves corresponding to the X-ray energy curve.

Respectfully submitted,

Donald E. Billings
Donald E. Billings
Project Scientist

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